

Let's Compare Bricks...

Clay -v- Concrete

Clay brick -v- Concrete brick; A comparative guide
November 2022



One of the myths surrounding the use of bricks in construction, is that a brick is just a brick and that all bricks are the same! Not so...

Bricks come in all manner of shape, size, colour and density. They are designed to perform differing functions from providing structural strength at the foundations of a building, to offering hard wearing paving or even flood resistant cladding. The most popular use of any brick however, is what we see everywhere in the built environment. That of the most beautiful of materials for external walls on a home, office or industrial building, the humble clay brick.

A brick is often defined in dictionaries as being traditionally made of natural clay, that's true and there's nothing quite like it!

Because of this and the popularity, beauty and proven performance of clay bricks, we are increasingly seeing a number of imitation products coming into the market, including vinyl brick-like coverings, plastic cladding boards pre-shaped like bricks, and probably closest to the real thing, the so-called concrete 'brick'.

This document is designed therefore to help dispel some of the myths surrounding this latter imitation and is aimed at providing better information to those wishing to use a **truly sustainable product such as clay brick.**

Keith Aldis

Chief Executive

Brick Development Association

About the Brick Development Association

The Brick Development Association is an independent body committed to providing authoritative information about the use of brick in construction. Our remit is to provide free technical support on the use of brick, collate statistical information and to celebrate best practice in the use of brick in the built environment.

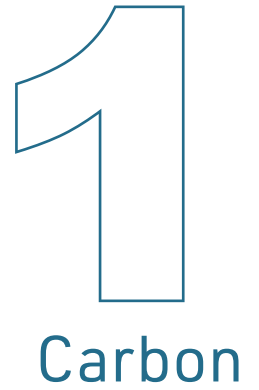
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Carbon Emitted Per m²

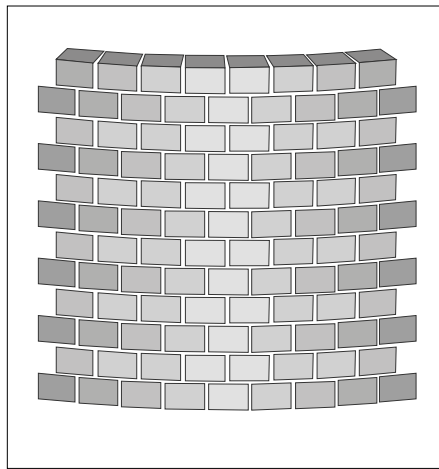
Carbon use for both clay and concrete bricks is on a par, on a per m² basis *(data based on market-based emissions calculation 2021 - mortar excluded).*

New investments in processes currently being developed by the UK clay brick industry, such as renewable energy, carbon capture, bio-mass, and hydrogen fuelling, will potentially see further carbon reductions in clay brick production for the future.

Mythbuster: Did you know? **Concrete 'bricks' are incorrectly named** since they are in reality small concrete blocks. A 'brick' is traditionally made of clay. - Collins



Concrete Brick - Note the joint on the gable.



Concrete Brick

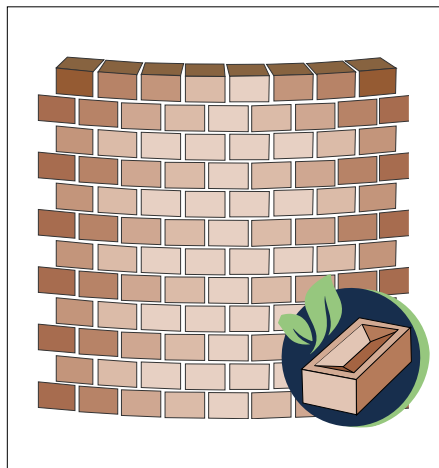
26.5 kg of CO₂/m²

A selected* brick from a leading concrete brick maker showed their product to have 26.5 kg of CO₂/m².

They also report that their 'Strong Coloured' and 'Light Coloured' products have 20.6 kg of CO₂/m² and 18.7 kg of CO₂/m² respectively.



Clay Brick - Catherine Hughes



Clay Brick

26 kg of CO₂/m²

Independent assessment in 2022, by the British Ceramics Confederation, from a product range of approximately 2,500 different types of clay brick, made by UK clay brickmakers, report an '**industry average**' of 26 kg of CO₂/m².

In many cases this is far less and is reported as being as low as **14 kg** of CO₂/m².

Sources

Concrete: 2020 - Marshalls PLC - Carbon numbers quoted on a selected 3 types of concrete brick made by them. * Marshalls 'White Concrete Brick'

Clay: 2022 - British Ceramics Confederation - Carbon numbers measured on 2,500 clay brick products made by 12 UK manufacturers, giving an 'industry average'.

Top Tips

01 Think Environment!

Clay bricks are made from natural products such as clay & water. Other so-called 'Carbon free' bricks such as those made from wastes, potentially contain carbon rich additives.

02 Consult

Consult with the brickmaker to confirm that the brick is suitable for the job. View the products before buying. Any clay brickmaker will be proud to show you around their factory.

03 Calculate your carbon.

Check if the Environmental Product Declaration (EPD) is for the product advertised and check that that it includes A to D (i.e. the full lifecycle of the product). The Clay brick EPD does.

04 Carbon in transport

Avoid buying bricks from factories you cannot visit personally or that are a long way from your site. Not sourcing locally means additional carbon is used in transporting your bricks to site.

05 Test the product

Test for build time. Concrete bricks take up to 30% more time to lay than clay bricks, meaning extra cost. Check with a responsible brickwork contractor who will confirm this.



Carbon Emmissions from Production

Through the use of new production methods, the UK clay brick sector is steadily de-carbonising its production and delivery processes, thus supporting the UK Government’s roadmap towards net-zero in 2050.

On a per m2 basis, **carbon use in production has reduced in clay brick by about 8 kg of CO2/m2, since 2015.**

2015	34 kg of CO2/m2
2021	26 kg of CO2/m2 <i>(provisional fig)</i>

The UK clay brick sector is also investing significantly in modern efficient kilns and production lines able to produce clay brick at high volumes so as to minimise environmental impact.

The production of clay bricks is rapidly modernising too with brickmakers implementing new and more cost effective ways to reduce carbon through the use of ‘greener’ energy sources for example, heat-capture to dry bricks before firing, bio-mass fuelling for kilns and solar charging for anciliary activites.

Mythbuster: *Did you know? Clay brick can be reclaimed, repurposed and reused, unlike many other construction materials which otherwise, may go into landfill.*



Production

Mythbuster: *Did you know? UK clay brickmakers have invested £250m in building new brickmaking facilities over the last 5 years, including Europe’s largest brick factory and the world’s first Net-Zero brick factory. It’s a traditional industry that is rapidly modernising.*



Source

Brick Development Association - Sustainability Reports 2016 and 2022, *(due to be published in December 2022)*

Top Tips



01 Think Clay Brick!
The UK clay brickmaking industry plays a vital part in the UK government’s housing programmes. We make 2bn bricks per year & growing.

02 Talk to your clients
Home buyers want a warm, beautiful home to live in. Ask anyone what this means and they’ll tell you, clay brick!

03 Clay reduces carbon
Clay brick has a great ‘thermal mass’, It keeps homes warm in winter and cool in summer, this reduces your carbon footprint, through unnecessary heating or cooling your home.

04 Sustainably sourced
The UK has significant clay deposits and so as a result, almost everything we make here, is used in the UK. The supply is sustainably managed and will be there for generations to come.

05 Reuseable every time
Clay brick can be reused time & time again. Many homes are built using reclaimed brick so its potential as a sustainable material, is certain!

Carbon Footprint is reduced with Longevity

Clay brick, has a proven heritage over thousands of years.

With clay brick the 'in use' lifetime is plotted at 150 years and as a result, you will see many examples of buildings built of clay brick which have lasted much longer. Its longevity is well proven.

Concrete brick on the other hand is a relatively new product which remains largely unproven. As a result, like most other new materials it has yet to be seen as to whether it will last like clay brick does, without maintenance during this time.

Continually maintaining external walls could result in a **significant increase in the use of carbon over the shorter design lifetime of the building** as a result of using concrete brick or other cladding materials.

We believe **clay brick is one of the best and longest lasting building products available!**



Longevity

Mythbuster: *Did you know? Clay brick emits **zero operational carbon during its lifetime**, unlike some other external wall materials which often need regular maintenance and even replacement, due to their limited lifespan, thus potentially using more carbon.*



Hampton Court Palace built of clay brick, in 1514



1980's Concrete Brick Home



Top Tips



01 Beauty

Beauty is in the eye of the beholder, so they say. Who disagrees that clay brick makes for a beautiful building?

02 Warmth

A single clay brick not only has a great 'thermal mass' but it also looks and presents a warm, secure and appealing feeling to prospective home owners.

03 Sharp or smooth?

Clay bricks come in all sorts of textures. Sharp, hard and dense for engineering applications or soft, light and smooth for facing buildings.

04 Natural brightness

Almost all clay bricks come in bright colours which get better with age. Concrete bricks use artificial additives to colour them, which can add unnecessarily to the carbon footprint.

05 Proven perfection

Every city, town & village in the UK contains a number of clay brick buildings. People love them! They are truly part of the British vernacular!

Weight & Distance impacts your Carbon Footprint

A clay brick weighs roughly 2.13kg. A concrete brick of the same dimensions, will invariably be considerably heavier (at between 2.3kg and 3.1kg), and denser. The net effect of this, is threefold:

1). Carbon Footprint & Transport

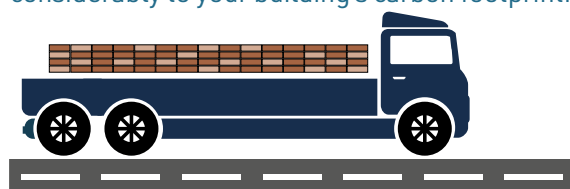
In transport, because of the heavy weight of concrete, fewer bricks can be moved at any one time meaning extra journeys, using extra fuel. This results in increased road traffic, pollution and increased carbon footprint during transportation.

2). Time to Build

When laid, concrete bricks are denser and heavier which limits the height and speed of construction because the wet mortar is 'squeezed' out from the lower joints. Building with concrete bricks is slower and thus more costly, potentially increasing carbon footprint, because site operations may have to continue for longer, unnecessarily.

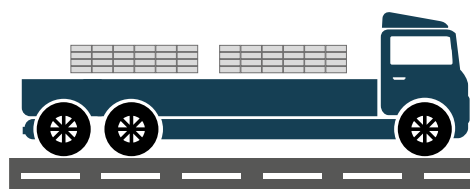
3). Distance to Site

There are far fewer concrete brick making factories in the UK than there are for clay bricks, meaning that transport distances from factory to site is increased significantly. Transporting concrete bricks to site, may add considerably to your building's carbon footprint.



Clay - 68 miles average distance for delivery.

More clay bricks, less weight + fewer trips = **lower Carbon footprint**



Concrete - Potentially greater distance to delivery?

Fewer concrete bricks, greater weight + more trips = **higher Carbon footprint**

4 Transport

Mythbuster: *Did you know? **Sourcing locally reduces transport costs and fuel use** and there are many brick factories around the country offering short transport distances and bricks matching the local vernacular.*



Factors relating to weight & distance, may seriously impact your carbon footprint!

Mythbuster: *Did you know? **Concrete bricks are more difficult to cut, lay and work with**, because they are much heavier and denser than clay bricks. Ask any responsible brickwork contractor!*

Top Tips



01 Speak to a specialist
Specialist Brickwork contractors know the difference between using clay and concrete bricks. They will advise on the most suitable product for the job and importantly the time and cost.

02 Locally sourced?
There are 50 clay UK brick factories. Ask the BDA for a copy of the 'Brickmaker's Map' showing where they are. You'll reduce your project's carbon footprint by sourcing locally.

03 Avoid cutting tools
Concrete bricks are notoriously difficult to cut because of their hardness and density and require a diamond tipped saw and therefore energy. Clay bricks are easily cut by hand.

04 Weight = Carbon
Avoid transporting heavy products over long distances. Doing so means increased carbon footprint, pollution and greater inconvenience for road users.

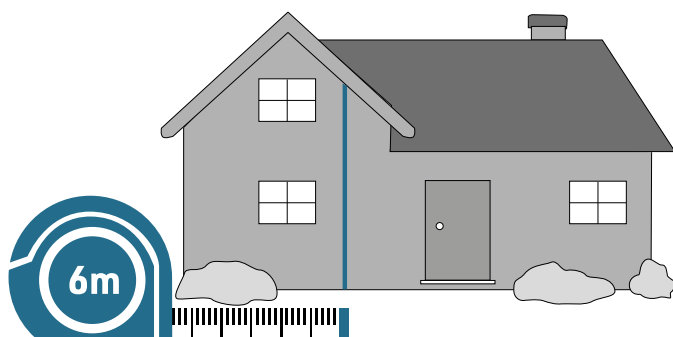
05 What about mortar?
All brick & block buildings require mortar to 'glue' the product together. Take advice as to the best mortars to use to help reduce your carbon footprint.

Movement Joints

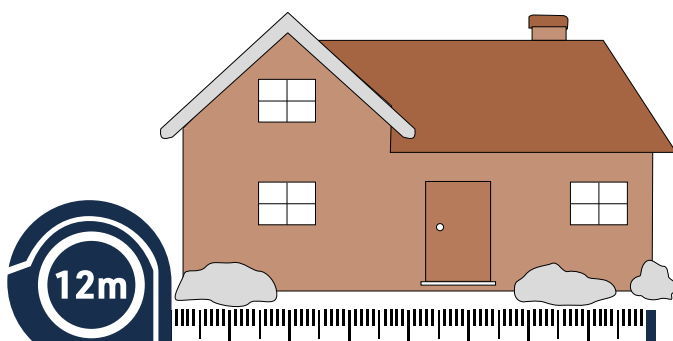
Clay brick remains beautiful over a proven long period and retains stability and adaptability because of its natural components of clay and water and its simpler production process.

There is an unfortunate legacy of concrete bricks cracking due to insufficient movement joints. As a result, concrete bricks have to have twice the number of movement joints, leading to unsightly joint exposure and less 'kerb appeal'.

Concrete



Clay



Mythbuster: *Did you know? Concrete bricks have twice the number of expansion joints. This can lead to increased carbon footprint because of the materials used to fill the joints. You can usually spot a home built of concrete bricks because if the gable end is more than 6m in width, you'll see an expansion joint part way down it.*

Top Tips



01 Think Cost!

Increasing the number of expansion joints in your structure can lead to extra cost as you will have to purchase specialist sealants and apply them correctly. It slows down build time too.

02 Does it look good?

More expansion joints, often across the gable of a new home, looks unsightly and can result in a lack of 'kerb appeal', meaning a loss in value.

03 Water penetration

Concrete shrinks dependent on 'ambient temperature' whilst clay expands which can result in movement joints for concrete bricks becoming wider, potentially increasing water penetration.

04 Bright or Grey?

Homes built using clay brick retain their brightness which has been proven over time. Homes built using concrete bricks are known to turn 'grey' as the concrete brick weathers.

05 Gable-end joints?

There are so many examples of concrete brick homes with an expansion joint part way down the gable end, because a home is usually more than 6m in width. It's so unnecessary!

5

Movement

Concrete Brick

Expansion & compression Joints are spaced at every:

6m

leading to twice the number of expansion joints as clay brick.

A concrete brick home will undoubtedly have more frequent and unsightly jointing.

Clay Brick

Expansion & compression Joints are spaced at every:

12m

This leads to half the number of expansion joints as a concrete brick home, reducing the additional carbon used for manufacturing and applying the sealant. And less unsightly jointing.

Variety & Colour

There are about 2,500 different types of clay brick made in the UK. The range is enormous in terms of colour, shape, size and texture. There are 12 BDA brickmakers making clay bricks in 50 factories locations in the UK.

The manufacture of concrete bricks on the other hand, is limited to about 100 product lines, mostly uniform in texture and style and severely limited in colour. There are about 6 factories in the UK.



Variety

Clay Brick

Clay bricks come in a wonderful variety of colours, textures size and shape, from beautiful blacks through to blues, greys, yellows, oranges, reds, creams and pure whites. A proverbial rainbow of natural colours!

The process for making clay bricks is relatively simple and everything is done at the brick factory.

The very desirable 'handmades', and 'specials' are made by skilled artisans. Something that concrete bricks lack.

With over 2,500 different clay brick products made in the UK, the choice is almost endless.

Concrete Brick

Concrete bricks use a variety of artificial additives to give colour but they also have an historic legacy of colour leaching, turning them 'grey'.

The process for making concrete bricks including the pre-manufacture of cements and additives, is relatively complex.

Only about 2% of bricks made in the UK for the housing market, are made from concrete.

Mythbuster: *Did you know? Clay brick has a proven heritage over millennia . They are known to retain their colour and improve with age, unlike concrete bricks.*



Mythbuster: *Did you know? Concrete bricks fade over time. Clay brick is easily distinguishable from concrete bricks as they retain their colour throughout and are seen generally part of the local heritage and identity.*

Clay - Large Choice



Concrete - Less Choice



Top Tips



01 Clay colour variety
Clay bricks come in a variety of colours from black, blues, greys, oranges, reds, creams and pure whites. Many get their colour from the natural clay that they are made from.

02 Concrete colours
Concrete bricks are naturally grey because of the ingredients used like cement, additives and aggregates. They are artificially coloured which often leach over time, turning them grey.

03 Carbon
On a per m2 basis, clay and concrete bricks are level in terms of their carbon footprint. The UK clay brick industry is moving steadily to reduce further, the footprint of clay bricks.

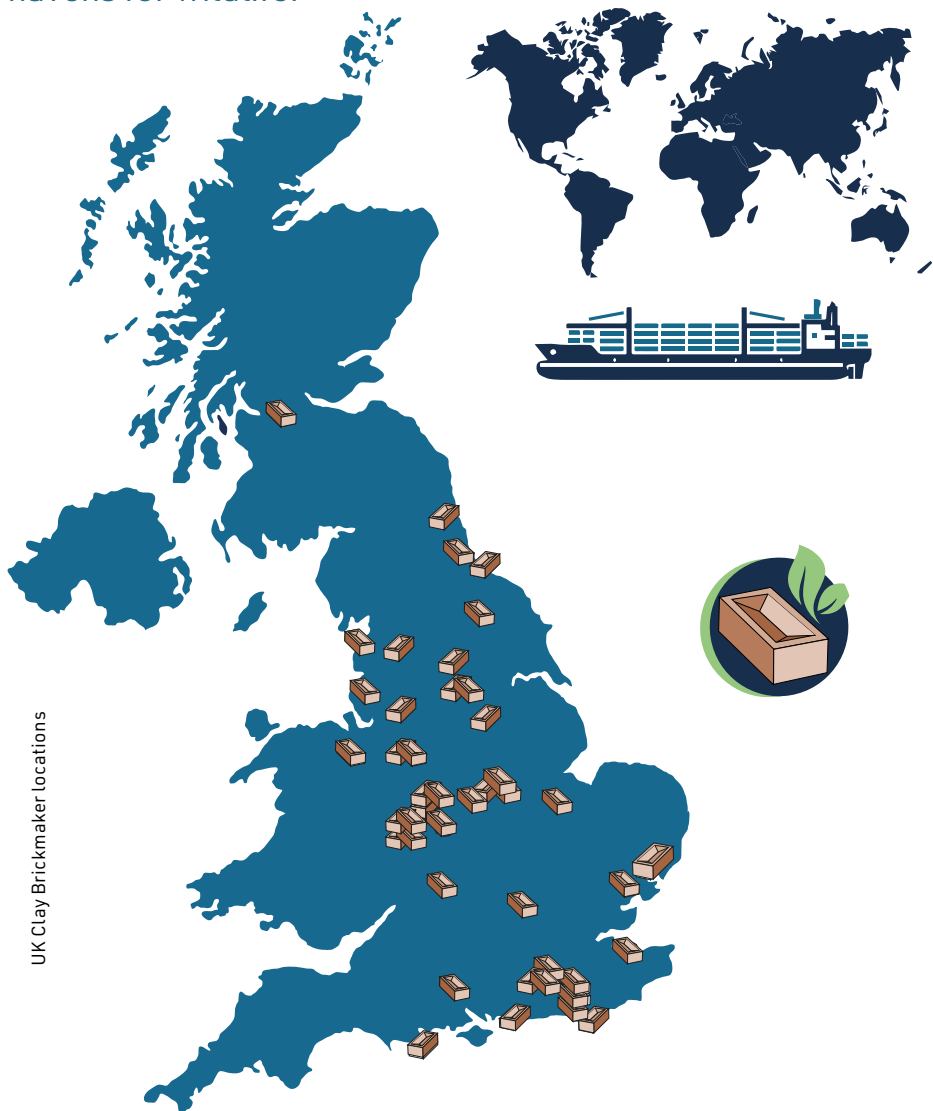
04 Heritage
Clay brick has a proven heritage since it has been used over millennia. Many examples can be seen in the UK of Roman clay bricks that still retain their brightness, colour and function.

05 A flexible advantage?
Because of the enormous variety of product within the clay brick portfolio, architects and designers have a flexible advantage for their building options.

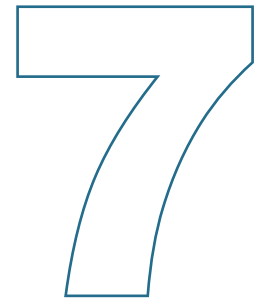
Environmental Impact

Clay brickmaking is localised, using abundant local clay and more frequently, collected surface water. We generally make clay bricks where the clay is sited in the UK using natural ingredients, lessening the environmental impact of transport distances or time to deliver and costs.

Because UK clay brickmaking is strictly controlled to meet environmental and planning standards, former clay quarries are always returned to nature and often become havens for wildlife.



UK Clay Brickmaker locations



Environment

Mythbuster: *Did you know?, Concrete bricks are made with cement which is fired in kilns at high temperatures before being powdered and mixed with additives, aggregates and water. It's a myth that concrete bricks do not use much energy in their manufacture.*

Concrete bricks, often require the importation of man-made, highly processed artificial components such as cement & additives. Together with natural aggregates.

The impact on the environment can be significant.

Resources of some aggregates is dwindling.

Top Tips



01 Efficient energy
UK clay brickmakers are committed to reducing CO2 emissions through the efficient use of energy. For example, they will re-use waste heat to dry bricks prior to firing.

02 Landscape
Wherever clay is extracted, UK brickmakers are committed to re-landscaping their former quarries.

03 Rewilding
Former clay quarries, once exhausted are rewilded to provide a natural habitat for many forms of wildlife, providing a pleasant environment for activities like dog walking, angling and boating.

04 Imports
The UK is self sufficient in clay, and so the need for importing it is negated saving fossil fuels and reducing CO2 emissions.

05 Noise
Clay bricks are very efficient acoustically speaking, meaning that when a home is built of clay brick, it will reduce sound transmission through walls keeping noise to a minimum.

Let's Compare Bricks!

Clay or Concrete?

26 kg of CO₂/m²
Verified 'Industry Average' across 2,500 products



26.5 kg of CO₂/m²
Manufacturer's popular Single Product



Clay brick CO₂ emissions are calculated across the process from cradle to grave and are wholly known. Manufactured at 50 UK locations, the **UK clay brick industry has reduced its emissions by about 8 kg of CO₂/m², since 2015.**



Concrete bricks are made by a limited number of manufacturers. Using concrete bricks may involve higher fossil fuel use in transport and limited availability.



Clay brick minimum 'in use' life is logged at **150 years**, during which time **zero carbon is emitted**. They are also **quicker to lay, saving build time & costs.**



Concrete bricks are relatively new as a product and as such their 'in use' service life is not proven. They are known to be **more difficult to work with and slower to lay increasing build time & costs.**



Clay bricks are lighter than concrete bricks. You can transport more at any one time, saving on fuel and road use, reducing overall carbon footprint. The **average distance a clay brick travels in the UK is 68 miles!**



Concrete bricks are heavier, meaning you can't transport as many for the same fuel use. Inevitably, fewer factories, means more frequent road use, and import costs for components, **increasing your overall carbon footprint.**



Clay bricks require **movement or compression joints every 12m**. That's twice the distance of concrete bricks, meaning a **better looking building with greater 'kerb appeal'.**



Concrete bricks have to have **movement or compression joints every 6m**. As a result, homes built using concrete bricks often have ugly expansion joints part way down their gable walls.



Clay bricks come in a wonderful **variety of colours, textures, sizes and shapes**. A veritable rainbow, with the addition that **they get more beautiful as they age!**



Concrete bricks are **known to fade over time turning 'grey'**. They are **limited in range including colour and type**. Architects and builders are restricted on options for creating beautiful buildings.



Clay bricks are **made locally, using abundant natural materials** such as clay and water. Making bricks locally means not only employment in the UK, but also **involves less carbon** since transport is local. Simply put, **true sustainability.**



Concrete bricks are often made using **imported products such as cement, aggregates and other additives**. As a result **carbon footprint can be unnecessarily increased** because of the additional fuel used.



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